Intraoperative spinal cord monitoring with Tce-MEP for cervical laminoplasty

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Introduction

• Cervical Laminoplasty is a safe and effective procedure for the treatment of compressive myelopathy.
• Postoperative motor paralysis remains a major complications of cervical laminoplasty.
• Postoperative segmental motor paralysis without sensory deficit, especially at the C5 myotome, so-called “C5 palsy”.
• The frequency of this paralysis has been reported to be 3 to 10%.
  - 10.6% (15/141) Chiba K, Spine, 2002
  - 2.3% (43/1858) Imagama S, JBJS (B), 2010
Purpose

- Prevention and intraoperative detection of paralysis have been among the major goals during cervical laminoplasty.
- Intraoperative neurophysiologic monitoring with transcranial electric motor evoked potentials (Tce-MEP) was performed on patients who underwent cervical laminoplasty.
- The purpose of the study is to evaluate the usefulness of intraoperative spinal cord monitoring with Tce-MEP for prediction of motor paralysis after cervical laminoplasty.
Methods

• 245 consecutive patients
  – Open-door cervical laminoplasty
  – Under surgical microscope
  – 168 men and 77 women
  – Mean age: 65 years (27-89 years)
    • Spondylotic myelopathy: 170 case
    • OPLL: 40 cases
    • Spondylotic amyotrophy: 19 cases
    • Disc herniation: 16 cases
  • Microsurgical foraminotomy was performed in 63 patients who had accompanying foraminal stenosis or radicular pain.
  • Neurological conditions were assessed using a scoring system proposed by the Japanese Orthopaedic Association (JOA score)
  • Functional improvement was expressed by the recovery rate (RR).
  • Mean follow-up period: 14 mos. (12-28 mos.)
Spinal cord monitoring

Tce-MEP: Transcranial electric motor evoked potentials

- Under total intravenous anesthesia (TIVA) including a propofol-narcotic protocol
- Delivered through pin-type electrodes
  - Unique Medical Corporation, Tokyo, Japan
- Recorded over the deltoid, biceps and triceps muscles in the bilateral upper extremities and lower extremities or thoracic spinal cord
- Averaged and stored in the Nicolet Viking / Endeavor system
  - Nicolet Biomedical, Inc., Madison, WI
Results

- All patients showed sufficient postoperative recovery from their clinical symptoms.
- Postoperative C5 palsy developed in 11 patients (4.7%, 9 males and 2 female) but there were no critical decrease in the amplitude of the evoked potentials.
- The incidence of C5 palsy involved 8 of 170 (4.7%) patients with cervical spondylotic myelopathy, 3 of 40 (7.5%) patients with cervical OPLL.
- The presence of OPLL was suggested to be a high risk factor of C5 palsy.
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Sensitivity: 1/12 (8.3\%)
Specificity: 1/8 (12.5\%)
C5 palsy case

61 y.o. male
- OPLL
- Clumsiness in fingers
- Numbness in hands
- Spastic gait
- No muscle weakness

JOA score: 11 pts.

C3-6 Laminoplasty

MRI T2WI
CTM
Intraoperative spinal cord monitoring with Tce-MEP
Postoperative course

Appropriate functional recovery
3 days p.o., experienced C5 palsy
  Lt. Deltoid MMT: 5 → 2
  Lt. Biceps MMT: 5 → 2
Recovered to MMT 5 within 6 mos.
Microsurgical foraminotomy

- May reduce C5 palsy
- With accompanying foraminal stenosis or radicular pain.

Conclusions

1. No abnormalities were observed on Tce-MEP monitoring even in those patients who developed postoperative transient C5 palsy.

2. These results suggest that the development of postoperative segmental palsy after cervical laminoplasty is not associated with intraoperative injury of the nerve root or the spinal cord.

3. Surgeons should be aware that segmental palsy is a possible complication of cervical laminoplasty even in the absence of intraoperative nerve injury.

Disclosures

FDA approval statue:
This presentation does not discuss or include any applicable devices/drugs.

The financial information:
The authors do not have a financial relationship that creates, or may be perceived as creating, a conflict related to this presentation.